530,860

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 April 2004 (22.04.2004)

PCT

(10) International Publication Number
WO 2004/032738 A1

(51) International Patent Classification[7]: A61B 5/0402

(21) International Application Number:
PCT/AU2003/001333

(22) International Filing Date: 9 October 2003 (09.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2002951925 9 October 2002 (09.10.2002) AU

(71) Applicant *(for all designated States except US)*: **QUEENSLAND UNIVERSITY OF TECHNOLOGY** [AU/AU]; Gardens Point Campus, 2 George Street, Brisbane, Queensland 4000 (AU).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **CORNISH, Bruce** [AU/AU]; 2 George Street, Brisbane, Queensland 4000 (AU). **THOMAS, Brian** [AU/AU]; 2 George Street, Brisbane, Queensland 4000 (AU). **CHETHAM, Scott** [AU/AU]; 2 George Street, Brisbane, Queensland 4000 (AU).

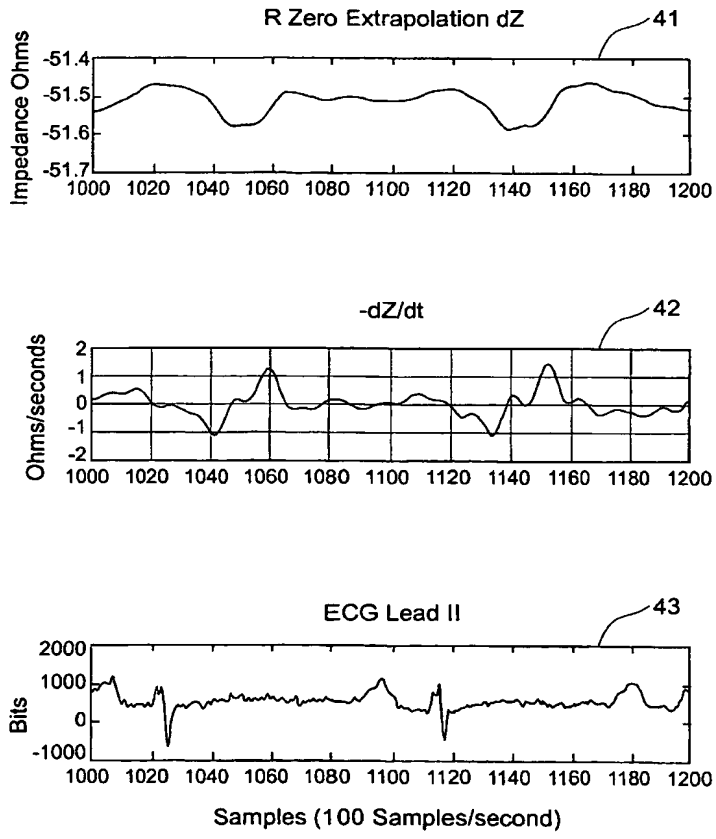
(74) Agent: **FISHER ADAMS KELLY**; Level 13, AMP Place, 10 Eagle Street, Brisbane, Queensland 4000 (AU).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

(54) Title: HIGH RESOLUTION BIO-IMPEDANCE DEVICE



(57) Abstract: A method and apparatus for the non-invasive measurement of cardiac function. A signal is applied between a pair of electrodes on a patient. The signal delivers a constant alternating current at multiple simultaneous frequencies. A second pair of electrodes measures a voltage signal. The impedance at each frequency is obtained by demodulating the current signal and the voltage signal using techniques such as Fast Fourier Transform (FFT). The FFT gives a phase and amplitude which is converted to an impedance value. The impedance values are fitted to a theoretical frequency dependent impedance locus and the locus is extrapolated to obtain a value at zero frequency. The steps are repeated to obtain a time-varying plot of impedance and measures of cardiac function are calculated from the time-varying plot.

WO 2004/032738 A1

European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:
— *with international search report*